

Advanced High Frequency High Voltage Power Converter, Phase I

Completed Technology Project (2018 - 2019)



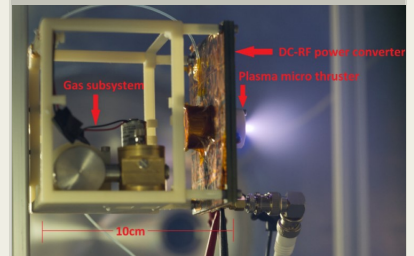
Project Introduction

Many existing or proposed NASA small propulsion systems and advanced scientific instruments will require high voltages at medium to high power levels to function. Such space power supplies are generally bulky and lossy and, as missions increasingly migrate to ever smaller platforms, there will be an increasing need to substantially reduce the size/weight costs of providing such on-board power access. The proposed program will address this increasingly expanding space power requirement by developing a new RadHard high performance / high voltage / high power (40V to 2kV at >94% efficiency) dc-dc converter capability that leverages new availability of high frequency (> 20 MHz) power MOSFET components. Utilizing this high frequency switching enables the use of core-less inductors that considerably reduce size and weight of the converters; integrating advanced magnetic materials will even further reduce size/weight costs. The design moreover incorporates new tunable filter technology along with a tunable matching network as to provide for a far larger near-optimal performance window than is presently available to any NASA (switching) design which introduces significant agility to be used across a wide-range of NASA mission needs and has potentially wide impact to all NASA converter designs.

Anticipated Benefits

The new high performance/high voltage/high power supply solution has a wide range of applications to SmallSat/CubeSat orbital maneuvering systems and scientific instruments that increasingly need on-board high voltage availability. The technology is synergistic with investments by NASA to develop SmallSat/CubeSat micropropulsion systems. The technology could significantly impact surface exploration missions by providing mission power solutions that greatly reduce lander size/weight loads.

The technology proposed directly expands our existing expanding markets, dominated by the needs of the munitions and missiles and oil & gas exploration industries, for high performance/high voltage/low power supply solutions. We are also closely allied with a major supplier of high voltage/high power supply solution to the medical and wafer fabrication markets that this would greatly impact.



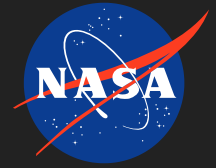
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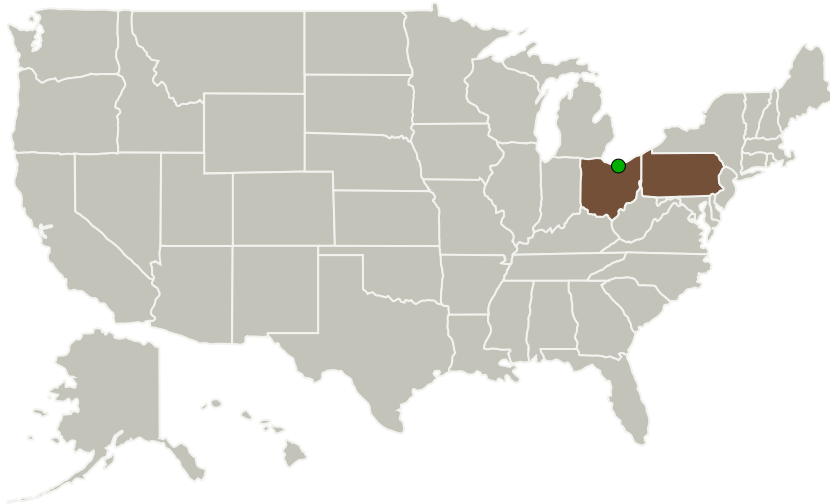
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
QorTek Inc	Lead Organization	Industry Small Disadvantaged Business (SDB)	Williamsport, Pennsylvania
● Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations

Ohio	Pennsylvania
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Project Transitions



July 2018: Project Start

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

QorTek Inc

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

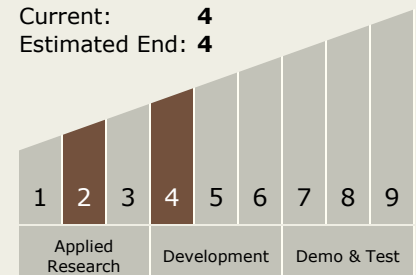
Gregory M Bower

Technology Maturity (TRL)

Start: 2

Current: 4

Estimated End: 4



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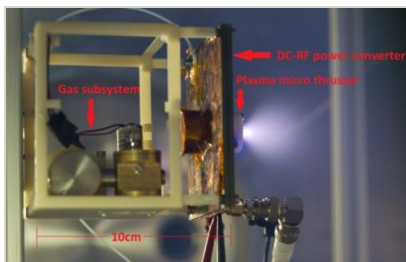


✓ **February 2019:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141243>)

Images



Final Summary Chart Image

Advanced High Frequency High Voltage Power Converter, Phase I
(<https://techport.nasa.gov/image/129837>)

Briefing Chart Image

Advanced High Frequency High Voltage Power Converter, Phase I
(<https://techport.nasa.gov/image/128685>)

Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
 - └ TX03.3 Power Management and Distribution
 - └ TX03.3.3 Electrical Power Conversion and Regulation

Target Destinations

The Moon, Mars, Earth